

# METAL CASTING

Project Fact Sheet



## CASTABILITY ASSESSMENT AND DATA INTEGRATION FOR DIE CASTING DESIGN

### BENEFITS

This project will improve productivity and quality in die casting. Through shorter lead times, less die tryout, and significantly fewer operating problems, scrap will be reduced. Scrap reductions will lead to reduced melting requirements and improved energy efficiency. Reduced energy requirements will lead to fewer emissions.

### APPLICATIONS

This research has broad applicability throughout the design phase of the die casting process. Results can be applied industry wide. This research will improve tooling design techniques that will lead to less time in getting castings to market. It will provide the die casting industry with design tools that will greatly reduce the cost and time associated with die casting, thereby industry competitiveness.

## ENHANCEMENTS TO CASTVIEW PROGRAM IMPROVE DIE CASTING DESIGN CAPABILITIES

The application of computer-aided design (CAD) and computer-aided engineering (CAE) technologies in the die casting industry is fairly common. Recently, the industry has begun to adopt the *CastView* program, an easy-to-use visualization tool which applies qualitative reasoning for rapid analysis of die design. *CastView* was developed under an earlier Metal Casting Industry of the Future research project. The current project will extend the capabilities of *CastView* by providing better integration with conventional CAD tools.

Castability assessment requires the development of methods that help users to measure the overall castability of a design and to evaluate the trade-offs inherent in configuring the die casting die. This research will develop simple mathematical models, scaling methods, and decision support aids. A set of indicators, such as the variance in wall thickness, will be extracted from the *CastView* data for input to the decision support model. Researchers will define data requirements for evaluation, and develop and test extraction techniques.

The research also will address methods to deal with geometric data that is defined using *CastView*. Geometric features are important information for the toolmaker. Exporting this information from *CastView* can accelerate the die design process. Researchers will develop and implement methods to export the data in a form that can be imported into a CAD system.

### VISUALIZATION TOOLS IMPROVING CASTING DESIGN

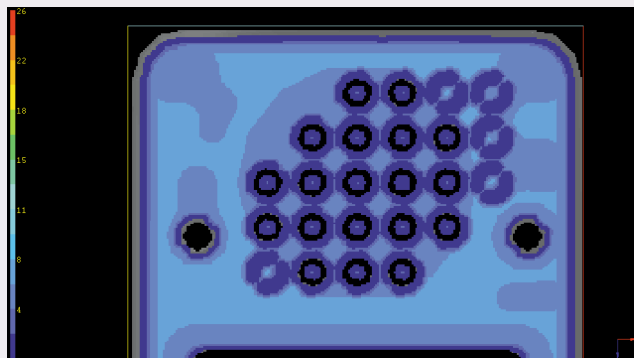


Image depicts variability in section thickness that impacts castability of the “dimple” features on this part.



## Showcase Description

**Goal:** The goal of this project is to improve the pace of the die casting part and die design process. It also is to improve the quality of die castings by:

- Providing techniques to quantitatively evaluate overall castability of a proposed part design and die configuration.
- Providing methods and data to directly evaluate the trade-offs between filling, cooling, and ejection as effected by parting plane and die configuration decisions.
- Providing techniques to export all geometric data produced within the *CastView* environment for use in computer-aided design.

## Progress and Milestones

This two year project began in January 2001. It consists of five primary tasks:

1. **Basic Geometry Data Extraction** - This task will develop and/or refine the basic methods used to construct and extract basic geometry from the *CastView* environment.
2. **Geometry Representation and Construction Improvements** - This task will enhance the reasoning and display methods used in the *CastView* system.
3. **Design Assessment/Interpretation Methods** - This task will develop features to provide design performance measures and to implement an evaluation reasoning process.
4. **Implement System Improvements** - Known weaknesses in current visualization methods, such as fill pattern visualization techniques, will be addressed.
5. **Field Tests and Evaluation** - Industry will test the results and modifications will be made.



### PROJECT PARTNERS

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Briggs & Stratton Corporation, West Allis, WI  
Chicago White Metal, Bensenville, IL  
Citation Corporation, Birmingham, AL  
DCD Technologies, Cleveland, OH  
Exco Engineering, New Market, Ontario, Can  
Flow Science, Inc., #####  
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General Die Casters, Inc., Peninsula, OH  
General Motors Powertrain, Ypsilanti, MI  
JL French Corporation, Sheboygan, WI  
Lester Precision Die Casting, Twinsburg, OH  
Magma Foundry Technologies, Inc.,  
Arlington Heights, IL  
North American Die Casting Association,  
Rosemont, IL  
Prince Machine, Holland, MI  
R&S Design, #####  
Ryobi Die Casting (USA), Inc., Shelbyville, IN  
SIMTEC, Inc., #####  
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